

# Organizational Form and Performance: the Cinema Chain Case\*

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## Abstract

In this article, I empirically examine whether the performance of a chain-affiliated movie theater is affected by its organizational form. I first develop a simultaneous model for performance and organizational form. Then, using movie theater data, I estimate the model and find that neither performance nor price is different between franchised and corporate-run theaters. The results suggest that chains adjust their governance forms to different market conditions and theater characteristics in such a way that in the end, there is no difference in the outcome that they care about – performance and price – across different governance forms.

**Keywords:** organizational form, performance, franchising

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# 1 Introduction

How a firm determines its boundary and what consequences the decision incurs is one of the central issues in economics. Regarding a firm's decision on whether to run a unit directly or through franchising contract, the principal-agent analysis predicts that performance may be either higher or lower under franchisee ownership. On one hand, as the residual claimant a franchisee owner has a stronger incentive than a corporate manager to exert costly efforts, which in turn may lead to increase in demand or decrease in cost. On the other hand, when monitoring is imperfect, he is more likely to free-ride on the reputation of the brand, that may lower the product quality. Since the firm takes the specific circumstance of a unit into account when it makes the organizational form decision for the unit, we usually observe that some units are franchised while others are corporately operated. In other words, the ownership mix implies that there may be no systematic difference in the performance between the two organizational forms.

The goal of this paper is to empirically examine whether the performance of an affiliated establishment is affected by its organizational mode. Apart from confirming the natural consequence of the optimal organizational form choice, this topic is important in that the survivability of an establishment in the long run is likely to be affected by the performance. Whereas the determinants of the firm boundary and its effects on certain outcomes such as price and product quality have been extensively studied, there is still little empirical evidence on how the firm boundary affects the performance.<sup>1</sup> This article contributes to the literature on organizational economics by filling this gap.

I first develop a simultaneous model for performance and organizational form. The model allows the possibility that the mode of organization affects the performance of an establishment. At the same time, the chain's decision on whether to franchise an establishment or to operate it corporately depends on its performance. Hence, the model extends the discrete response model of organization form choice commonly used in the previous literature (Brickley and Dark, 1987; Shepard, 1993; Blass and Carlton, 2001; Wilson, 2015a).

Then, using cross-sectional data on Korean movie theater industry, I examine whether the performance of a chain-affiliated theater depends on its mode of organization. Considering the audience per seat as the performance measure, I start with estimating the reduced-form model of performance. The potential endogeneity of the organizational form choice is handled by using an instrumental variable, land price, which enters only the organizational form decision model, and hence, serves as an exclusion restriction for the performance model. The seemingly large difference in performance between franchised and corporate theaters vanishes, once the endogeneity of the organizational form choice is controlled for. The reduced-form analysis also reveals that admission prices are not different under the two modes of organization.

Lastly, I estimate the simultaneous model by maximum likelihood. The estimation results of the performance model are consistent with the previous IV estimates. That is, the estimated

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<sup>1</sup>See Lafontaine and Slade (2012) for an overview.

performance difference between franchised and corporate theaters is economically and statistically insignificant. Also, the rise in land price increases the cost of running a theater and incentivizes the chain to franchise it. Additionally, I find that an affiliated theater located in a market with more favorable conditions is more likely to be company-operated. These findings are robust to considering revenue per seat as the performance measure.

Estimation results of both approaches suggest, in line with findings of the previous literature (Kosová et al., 2013), that firms adjust their governance forms to different market conditions and theater characteristics in such a way that in the end, there is no difference in the outcome that they care about – performance and price – across different governance forms. Therefore, the franchisor may obtain a uniformity in reputation across establishments operating under different circumstances (Lafontaine and Kaufmann, 1994). The empirical findings also rationalize the plural forms organization observed in many mature retail and service industries including lodging, gas-station, and restaurant.

This article is the most closely related to the empirical literature on how firm boundaries affect the performance. There are few papers that tackled this issue at the unit level.<sup>2</sup> Shelton (1967) exploited temporal shifts between franchisee-ownership and corporate management in a string of restaurants and found that profit is higher under franchisee-ownership. Arruñada et al. (2009)’s research on Spanish car dealerships showed that the profitability rises after outlets become vertically separated. However, their conclusions may be biased in that the temporal transitions were caused by personal reasons on franchisee’s part (Shelton, 1967) and the vertical separation took place only in outlets that underwent a sharp drop in the rate of unionized workers (Arruñada et al., 2009). In contrast, Kosová et al. (2013) studied the case where the governance choice of a firm is unrestricted and found no difference in performance and pricing among franchised and company-operated hotels. Complementing their work, I explore the effects of organizational form in the movie theater industry with more structural approach.

There are papers that looked at how other economic outcomes differ across different firm boundaries. Michael (2000) showed that franchising is negatively related to product and service quality in the hotel and restaurant industries, whereas Lawrence and Perrigot (2015) found mixed results regarding the relationship between organizational form and hotel visitors’ satisfaction. Jin and Leslie (2009) found evidence that franchised restaurants free-ride on chain reputation, exerting less effort to keep good hygiene. As for the relationship between vertical contract and price, Shepard (1993) and Wilson (2015b) showed that gasoline prices are lower in company-owned stations, whereas Hastings (2004) did not find such evidence. Kalnins (2016) found that the relationship may vary based on brand quality in the hotel industry. Similar to Hastings (2004) and Kosová et al. (2013), I present evidence that price is not different across franchised and corporate-operated theaters.<sup>3</sup>

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<sup>2</sup>Management scientists have studied the effect of a governance structure (for instance, the percentage of company-owned outlets) on chain-level performance or efficiency of a distribution network (Combs et al., 2004; Botti et al., 2009; Piot-Lepetit et al., 2014; Fadairo and Lanchimba, 2014; El Akremi et al., 2015).

<sup>3</sup>Also, there are papers that looked at the price effects of regulatory restrictions on vertical integration and control. Vita (2000) showed that the “divorcement” laws raise prices in gasoline retail industry. Gil (2015) studied the effect of 1948 Paramount antitrust case, and found that movie ticket prices increased after the vertical divestiture.

Over the last four decades, there has been a growing empirical literature on the determinants of the organizational form. The focus of these works was mainly on testing the agency-theoretic predictions on the organization form choice. Brickley and Dark (1987), Norton et al. (1988), Lafontaine (1992), Shepard (1993), Blass and Carlton (2001), Wilson (2015a), and Lafontaine et al. (2017) are examples of such work. Their findings suggest that a firm’s choice among different contractual arrangements depends on efficiency and cost considerations, which ultimately rely on market conditions and establishment characteristics. Following these previous works, I estimate a model of organizational form choice, but along with the performance model.

Next section presents the empirical model. In Section 3, I describe institutional details of the Korean movie theater industry as well as the data, and discuss the empirical findings of both reduced-form analysis and structural estimation. Section 4 concludes.

## 2 Model

In this section, I develop a simultaneous model for performance and organizational form. Similar to previous literature (Mazzeo, 2004; Kosová et al., 2013), to simplify the analysis and focus on the choice of the organizational form and its impact on performance, I assume that entry of an establishment is determined exogenously. This assumption is reasonable given that the organizational form decision is more flexible than the choice of whether and where to enter. I also consider the case that price in an outlet does not depend on its organizational form.<sup>4</sup>

Following previous literature (Shepard, 1993; Kosová et al., 2013; Wilson, 2015b), I focus on the binary difference between franchised and company-operated units. Therefore, the organizational form of an establishment is denoted by binary variable *Corporate* that is equal to one if the establishment is operated corporately and zero if franchised. A chain’s profit from an establishment depends on its organizational form. It takes the entire profit of a company-operated unit. If the establishment is franchised, then there is payments of royalty and lump-sum franchise fee from the independent owner of the unit to the chain. In return, the chain distributes products or services and provides the business-format to the establishment.<sup>5</sup>

To examine whether the organizational form of an establishment affects its performance, I denote the demand for the establishment as a function of its organizational form. Then, the chain’s profit from a company-operated unit  $\pi(1)$  is

$$\pi(1) = (p - c) \cdot D(1) - F, \tag{1}$$

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In contrast, my article considers the case where firms are allowed to freely choose how to organize their transactions.

<sup>4</sup>Therefore, a more comprehensive analysis would endogenize entry and expansion decision of an establishment as well as the price decision. In the next section, I show that the exogenous price assumption is not violated in the industry analyzed in this article.

<sup>5</sup>There are contractual forms different from those considered in this article. For example, under the lessee dealer arrangement in the retail gasoline industry, the refiner owns all the resources including the land and building and employs a high-powered manager whose payoff is proportional to the sales or profit in the station. The model in this article would not fit to such contractual forms.

where  $p$  is the price per consumer and  $D(1)$  is the demand for the unit under the corporate management, while  $F$  denotes the fixed cost such as rent and opportunity cost. From a franchised unit, the chain takes  $\tau$  percent of revenue in royalties as well as a lump-sum franchise fee  $\iota$ .<sup>6</sup> Therefore,

$$\pi(0) = \tau p \cdot D(0) + \iota. \quad (2)$$

The chain's organizational form choice depends on the size of  $\pi(1)$  relative to  $\pi(0)$ . That is, an establishment will be run corporately if

$$(p - c) \cdot D(1) - \tau p \cdot D(0) \geq F + \iota. \quad (3)$$

I measure performance in terms of the demand per capacity,  $d$ .<sup>7</sup> I further denote the per-capacity sum of the fixed cost and franchise fee as  $f$  and the percentage markup, that is, Lerner index, as  $L$ . Then, condition (3) is equivalent to

$$d(1) - \mu \cdot d(0) \geq f/(p - c), \quad (4)$$

where  $\mu$  is the ratio between royalty and Lerner index,  $\tau/L$ . To focus on the choice of organizational form rather than on the contractual terms, I assume that royalty  $\tau$  is proportional to the percentage markup; the more profitable an establishment, the higher the royalty. As a result,  $\mu$  is a constant.<sup>8</sup>

I specify the demand per capacity to depend on the organizational form, observed market conditions, and establishment characteristics as well as unobserved establishment-specific error term:

$$d = \alpha \text{Corporate} + \mathbf{x}_1 \beta + u, \quad (5)$$

where parameter  $\alpha$  measures the effect of the organizational form on performance and vector  $\mathbf{x}_1$  includes other controlling variables that will be described in the next section.<sup>9</sup> Specification (5) implies that

$$d(1) = \alpha + d(0). \quad (6)$$

Similarly, I consider the following cost function:

$$f/(p - c) = \mathbf{x}_2 \gamma + v, \quad (7)$$

where vector  $\mathbf{x}_2$  includes per-capacity rent as well as observed demographic characteristics.<sup>10</sup> Sub-

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<sup>6</sup>Revenue sharing is common in business-format franchising (Lafontaine and Slade, 2012).

<sup>7</sup>This is similar to the revenue per room typically used as a measure of performance in the hotel industry (Kosová et al., 2013). In the empirical analysis, I also consider the revenue per capacity as another performance measure.

<sup>8</sup>The contract term may be uniform across units and stable over time (Bhattacharyya and Lafontaine, 1995). Moreover, pricing and procurement decisions of a chain are usually made at the national level (Allain et al., 2017). Under these two conditions, both royalty rate  $\tau$  and Lerner index would be constant, and hence,  $\mu$  is also constant across establishments.

<sup>9</sup>In the reduced-form analysis, I also consider a log-linear specification using  $\ln d$  as the dependent variable.

<sup>10</sup>Both  $\mathbf{x}_1$  and  $\mathbf{x}_2$  include a constant.

stituting performance model (5) and fixed cost model (7) in condition (4) yields:

$$\alpha + \mathbf{x}_1(1 - \mu)\beta - \mathbf{x}_2\gamma - \omega \geq 0, \quad (8)$$

where  $\omega \equiv v - (1 - \mu)u$ . Consequently, I derive the following simultaneous model for performance and organizational form:

For franchised establishment (*Corporate* = 0):

$$\begin{aligned} d &= \mathbf{x}_1\beta + u, \\ \alpha + \mathbf{x}_1(1 - \mu)\beta - \mathbf{x}_2\gamma &< \omega. \end{aligned}$$

For corporate establishment (*Corporate* = 1):

$$\begin{aligned} d &= \alpha + \mathbf{x}_1\beta + u, \\ \alpha + \mathbf{x}_1(1 - \mu)\beta - \mathbf{x}_2\gamma &\geq \omega, \end{aligned}$$

### 3 Empirical analysis

I start this section with describing institutional details of the Korean movie theater industry and the data. Then, I take the reduced-form approach to study the link between the organizational form of a theater and its performance as well as the price. Finally, I estimate the full model and discuss the empirical results.

#### Industry background and data

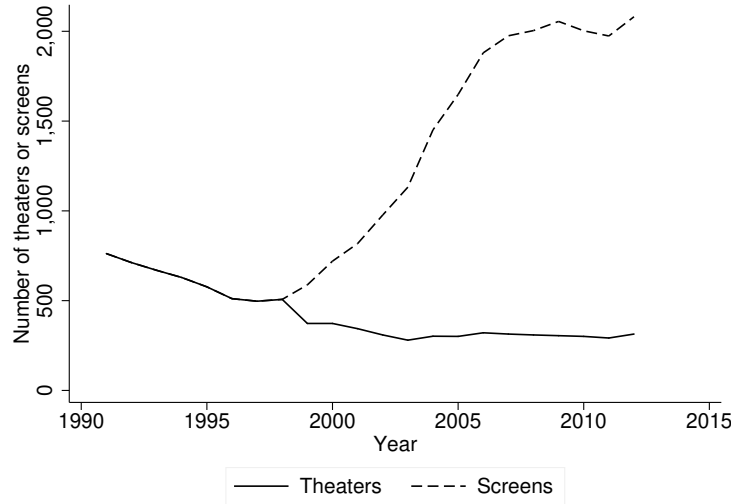
For the empirical analysis, I use a cross-sectional data set of Korean movie theaters in 2013. Initially, there existed only single-screen independent theaters in Korea. After the first affiliated theater opened in 1998, however, the movie theater industry sharply expanded till mid 2000s. During this period many chain-affiliated multiplex theaters opened, replacing old independent theaters. After the period of strong expansion, the industry became stabilized as the aggregate movie theater capacity trend in Figure 1 suggests. Therefore, it is reasonable to assume that by 2013 the industry became mature enough that the observed organizational forms are optimally chosen by chains.<sup>11</sup>

According to industry sources, a franchised theater usually pays 7 percent of its ticket and concession sales to the chain as royalty. As for the revenue sharing contracts between distribution and exhibition, a theater takes half of the after-tax box office of a movie in general and the terms of the contracts are fixed over the course of the movie's run. Therefore, the ratio between royalty and Lerner index  $\mu$  is unlikely to be high.

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<sup>11</sup>In the early years of rapid expansion theater chains might resorted to franchising to overcome the binding capital constraints (Caves and Murphy, 1976; Lafontaine and Kaufmann, 1994).

Figure 1: Growth of the movie theater industry in Korea



Source: Korean Film Council Annual Reports.

There are three cinema chains – CGV, Lotte Cinema, and Megabox. Detailed theater information including the name of chain and organizational form is provided by the Korean Film Council and combined with confidential audience data. According to Table 1, more than 90 percent of theaters in the data set are affiliated with chains in 2013.<sup>12</sup> Also, among 270 chain-affiliated theaters, 42 percent are franchised, while the rest 58 percent are company-owned. The table also shows that both organizational forms can be observed in each chain; the proportion of franchised theaters ranges from 33 percent to 62 percent. From the Korea Box Office Information System (KOBIS), I also obtain the average admission prices for 268 out of 270 theaters in the sample.

In this article, I consider administrative districts as geographic markets. There are 16 first-tier administrative divisions in Korea: 7 metropolitan cities and 9 provinces. They are further subdivided into “gu” in the case of metropolitan cities and “si” or “goon” in the case of provinces.<sup>13</sup> I call these second-tier entities as districts and define 111 local movie theater markets in the data. Then, I calculate the number of competitors for each chain-affiliated theater and their total number of seats using the above theater data.<sup>14</sup> Also, from the Korean Statistical Information Service, I obtain district-level population size and other demographic information such as percentage of women and percentage between age of 20 and 30 years; movie demand is higher in these two demographics.<sup>15</sup>

<sup>12</sup>Art theaters are excluded from consideration, as they are focusing on screening art films rather than commercial ones.

<sup>13</sup>For instance, the average surface area of the 16 “gu”s in Busan, the second largest city in Korea, is 48  $km^2$  with 212 thousand resident population.

<sup>14</sup>Independent theaters are included when counting the number of competitors (and their total number of seats) of a chain-affiliated theater. However, I exclude art theaters that screen art-house films only, since they are not directly compete with commercial movie theaters.

<sup>15</sup>Movie theater consumer survey, Korean Film Council, 2010.

Table 1: Theaters in Korea in 2013

	Franchised	Corporate	Total
<i>Chain-affiliated theaters</i>	113 (41.85%)	157 (58.15%)	270
CGV	46 (39.32%)	71 (60.68%)	117
Lotte Cinema	31 (32.63%)	64 (66.37%)	95
Megabox	36 (62.07%)	22 (37.93%)	58
<i>Independent theaters</i>			27

Additionally, I collect the officially assessed land price (per square meter) of each theater from the Korean National Spatial Data Infrastructure Portal and use the land price as the proxy for the per-capacity rent. Also, exploiting the address information of all coffee shops in Korea available at the Korean Public Data Portal, I calculate the number of coffee shops within a half kilometer distance of a theater and use it to control for the unobserved attractiveness of the theater's location.<sup>16</sup> It is expected that the more coffee shops around a theater, the more attractive its location, and as a result, the higher the performance of the theater.<sup>17</sup>

I measure the demand per capacity or performance of a theater by its daily audience per seat rather than audience per screen. The latter may be misleading if screens in a franchised theater have fewer seats than those in a corporate-run theater or vice versa. This is indeed the case as Figure A-2 that compares distributions of the screen size between the two organizational forms in the data shows; a screen has 154 seats on average in a franchised theater but 167 seats in a company-operated theater and the difference between them is significant at 1 percent.

Dropping three theaters for which land price is not available and two theaters whose land prices are more than twice of any other land prices as Figure A-1 shows leaves a sample of 265 observations.<sup>18</sup> Table 2 provides descriptive statistics of the variables, separately for 113 franchised theaters and 152 corporate theaters in the data. On average, a company-operated theater attracts more consumers per seat (two consumers a day) compared to a franchised theater (1.3 consumers). The unconditional average admission price seems slightly higher in corporate-run theaters and the gap is larger on weekends. A franchised theater is likely to be located in a market with less favorable conditions, that is, smaller population size, fewer coffee shops, and lower per capita income than a company-owned theater. In return, the former faces lower degree of competition than the latter on average. Binary variable *Metro area* is equal to one if the theater is located in one of the seven metropolitan cities. According to the table, the probability that an affiliated theater is corporately

<sup>16</sup>I check the robustness of the empirical results to the change in the distance band.

<sup>17</sup>The address of each data source is: (1) <http://www.kofic.or.kr/> (the Korean Film Council), (2) <http://www.kobis.or.kr/> (KOBIS), <http://kosis.kr/eng/> (the Korean Statistical Information Service), (3) <http://www.nsd.go.kr/lxportal/?menu=4074> (the Korean National Spatial Data Infrastructure Portal), and (4) <https://www.data.go.kr/search/index.do> (the Korean Public Data Portal).

<sup>18</sup>These two theaters are located in a district in Seoul where the land price is the most highest in Korea. Estimation results of the simultaneous model are not qualitatively different when these two outliers are included.



Table 2: Descriptive statistics

Variable	Franchised: 113 theaters		Corporate: 152 theaters	
	Avg.	Std. Dev.	Avg.	Std. Dev.
Daily audience per seat	1.32	0.59	1.99	0.59
Average ticket price (in US dollar)	7.08	0.41	7.41	0.34
- On weekends	7.32	0.52	7.77	0.47
Number of competitors' seats (in 1,000)	3.01	2.61	3.48	2.56
Population (in million)	0.39	0.23	0.48	0.26
Number of coffee shops (in 100)	0.38	0.33	0.53	0.51
% female	0.50	0.01	0.50	0.01
% 20s	0.14	0.02	0.15	0.02
Income (in 10,000 US dollars)	2.49	1.97	3.13	4.85
Metro area	0.57	0.50	0.82	0.38
Number of screens	7.09	2.06	7.64	2.37
% 3D screen	0.27	0.20	0.53	0.25
Theater age	4.78	3.08	6.10	4.12
Land price per $m^2$ (in 1,000 US dollars)	3.41	3.78	4.90	5.20

operated is higher in seven metropolitan cities than in nine provinces in Korea. As for the theater characteristics, company-owned theaters tend to have more screens (7.6), better quality in that the share of 3D screens is higher (53 percent), and older (6.1 years) than franchised ones (7.1 screens, 27 percent, 4.8 years, respectively).

### Reduced-form analysis

Here I take the reduced-form approach, estimating only performance model (5). I begin the analysis with OLS and then apply instrumental variables (IV) methods given the endogenous nature of organization form choice.<sup>19</sup>

According to the OLS estimators reported in the first column of Table 3, company-owned theaters show higher performance than franchised ones. Specifically, a corporate theater attracts 0.34 more consumers per seat a day. Additionally, as expected, the performance of a chain-affiliated theater is negatively affected by the competition but positively affected by the local market size and the attractiveness of its location. Also, performance is higher in better-equipped theaters.

Next, I estimate the performance model using instrumental variables (IV) methods. One important implication of the full simultaneous model is that land price can serve as a natural instrumental variable to identify the effect of the organizational form on the performance. It does not directly affect the performance. Yet, it is correlated with the organizational form, since the rise in land price would increase the likelihood of an establishment to be franchised rather than being corporately operated. 2SLS estimation results presented in the second column of Table 3 show that estimates

<sup>19</sup>In all estimations, I report robust standard errors clustered by market. Also, I estimate models in levels, but the results are qualitatively the same under log-linear specifications. See Table A-1.

Table 3: Reduced-form performance analysis

Variable	Audience per seat			Revenue per seat		
	OLS	IV methods		OLS	IV methods	
		2SLS	Two-step		2SLS	Two-step
Corporate	0.335*** (0.072)	-0.650 (0.666)	-0.253 (0.427)	2.689*** (0.543)	-5.137 (5.026)	-1.797 (3.233)
Number of competitors' seats	-0.120*** (0.016)	-0.135*** (0.027)	-0.129*** (0.021)	-0.973*** (0.125)	-1.080*** (0.206)	-1.034*** (0.159)
Population	1.002*** (0.164)	1.375*** (0.357)	1.225*** (0.260)	8.900*** (1.418)	11.767*** (2.705)	10.544*** (2.024)
Number of coffee shops	0.226*** (0.084)	0.209** (0.082)	0.216*** (0.077)	1.788*** (0.652)	1.690*** (0.636)	1.732*** (0.593)
% female	3.990 (4.072)	4.356 (5.272)	4.209 (4.559)	25.402 (30.558)	21.467 (38.958)	23.147 (33.127)
% 20s	3.239** (1.432)	5.535** (2.287)	4.610** (1.843)	22.580** (11.383)	40.752** (17.790)	32.996** (14.364)
Income	0.010** (0.005)	0.019** (0.009)	0.016** (0.007)	0.099** (0.041)	0.167** (0.071)	0.138*** (0.053)
Metro area	0.041 (0.068)	0.177 (0.130)	0.122 (0.096)	0.222 (0.537)	1.321 (0.993)	0.852 (0.742)
Number of screens	0.018 (0.017)	0.039 (0.026)	0.030 (0.021)	0.151 (0.134)	0.333 (0.204)	0.255 (0.159)
% 3D screen	0.867*** (0.128)	1.630*** (0.536)	1.323*** (0.345)	6.750*** (0.983)	12.848*** (4.070)	10.245*** (2.596)
Theater age	-0.007 (0.009)	0.005 (0.017)	0.000 (0.013)	-0.088 (0.067)	0.009 (0.126)	-0.032 (0.094)
Constant	-1.498 (2.061)	-2.200 (2.662)	-1.917 (2.316)	-9.198 (15.521)	-11.412 (19.454)	-10.467 (16.760)
Fixed effects						
Chain	Yes	Yes	Yes	Yes	Yes	Yes
Observations	265	265	265	263	263	263

Note: The table presents 2SLS estimates of model (5) using daily audience per seat and daily revenue per seat as the dependent variable one by one. The endogenous regressor *Corporate* is instrumented by the instrumental variable *Land price* (in 2SLS) or  $\widehat{Corporate}$  (in two-step IV). Robust standard errors (clustered by market) are in parentheses. The notation \*\*\* indicates significance at 1% level, \*\* at 5% level, \* at 10% level.

of the effects of market conditions and theater characteristics are similar to OLS estimates. Interestingly, however, the difference in performance between the two types of chain-affiliated theaters is not statistically significant. Given that *Corporate* is a binary variable, I also estimate the model using the two-step IV method; I first estimate a Probit model and obtain the predicted probability of being company-operated,  $\widehat{Corporate}$ . Then, I use it as the instrumental variable and estimate model (5).<sup>20</sup> Estimation results reported in the third column of Table 3 show that the estimated

<sup>20</sup>This method is known to be more efficient than 2SLS under stronger assumptions. Also, the usual 2SLS standard errors are asymptotically valid. See section 21.4 of Wooldridge (2010). In Table A-2, I report bootstrapped standard errors (200 cluster bootstrap replications).

performance difference is smaller than under 2SLS or OLS and is not statistically significant.<sup>21</sup>

As an alternative measure of performance, I consider the daily revenue per seat, that is, daily audience per seat times the average admission price and check whether the results are robust to this change. Estimates presented in the last three columns of Table 3 are qualitatively the same as before; whereas OLS estimate of the organizational form coefficient is positive and significant, under the two IV methods there seems to be no statistically significant difference in performance between franchised and company-owned theaters. In sum, the reduced-form analysis reveals that the seemingly higher performance of company-operated theaters vanishes after addressing the endogeneity of the organizational form.

One of the assumptions imposed on the full model is that the organizational form of an establishment does not affect its price. Now, I check whether this assumption is supported by the data, and therefore, the model fits to the industry analyzed here. For a theater, price per consumer is the sum of the admission price and the price of other goods such as popcorn and drinks.<sup>22</sup> Although data on concession price are not available, there is anecdotal evidence that it is uniform within and across chains in Korea.<sup>23</sup> Therefore, I focus on the movie ticket price by using it as the dependent variable in model (5).

Estimation results of the price analysis are reported in Table 4. OLS estimates in the first column suggest that admission price is higher by a quarter dollar in company-owned theaters than in franchised ones. However, the difference becomes statistically insignificant after controlling for the endogeneity bias. In addition, I find evidence of the negative competition effect on price, although its magnitude is economically modest; entry of a competitor with 1,000 seats decreases the admission price in an incumbent chain-affiliated theater by seven cents. This price rigidity is consistent with the findings of previous literature (Davis, 2005; Kim, 2018). The magnitudes and statistical significances of the effects of other market conditions and theater characteristics are similar under OLS and IV methods. I also examine whether the chain's pricing behavior changes when the demand is high, that is, on weekends by using the average admission price on weekends as the dependent variable.<sup>24</sup> As the results in the last three columns of the table suggest, there is no evidence of price difference between the two forms of organization on weekends.

I further check the relationship between the governance structure and outcomes of interest within a chain by estimating the model by chain. Given the smaller sample size of each chain, I drop three variables from the model whose effects are not significant at 10 percent under 2SLS and report estimates in Table A-4.<sup>25</sup> Since F-statistics on significance of IV suggest that the instruments are not strong enough, the estimation here is suggestive of no differences in both performance and

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<sup>21</sup>First stage estimation results of both IV methods are reported in Table A-3. Instruments are significant at 1 percent and the F-statistics on significance of IV are nearly 10, a rule of thumb indicating weak instruments, or above.

<sup>22</sup>The majority of theater revenue comes from selling movie tickets. For instance, according to the annual report of CGV, the leading movie theater chain in Korea, it took 66 percent of the total revenue in 2012.

<sup>23</sup><http://news.donga.com/Economy/more29/3/all/20140602/63965489/1>

<sup>24</sup>I consider Friday as part of the weekend. In 2013, the average daily audience size was 815,000 on weekends which is approximately twice bigger than that on weekdays, 414,000.

<sup>25</sup>Including them in the model does not affect the results.

Table 4: Reduced-form price analysis

Variable	Admission price			Admission price on weekends		
	OLS	IV methods		OLS	IV methods	
		2SLS	Two-step		2SLS	Two-step
Corporate	0.247*** (0.048)	-0.116 (0.275)	0.130 (0.238)	0.317*** (0.065)	-0.634 (0.467)	-0.116 (0.350)
Number of competitors' seats	-0.067*** (0.015)	-0.072*** (0.017)	-0.069*** (0.016)	-0.090*** (0.020)	-0.103*** (0.027)	-0.096*** (0.022)
Population	0.927*** (0.172)	1.060*** (0.188)	0.970*** (0.182)	1.402*** (0.214)	1.750*** (0.277)	1.560*** (0.239)
Number of coffee shops	0.046 (0.052)	0.042 (0.053)	0.045 (0.050)	0.063 (0.071)	0.051 (0.087)	0.057 (0.072)
% female	0.613 (2.860)	0.431 (2.978)	0.554 (2.799)	0.433 (3.678)	-0.045 (4.637)	0.216 (3.822)
% 20s	-0.348 (1.213)	0.495 (1.316)	-0.076 (1.200)	-0.627 (1.590)	1.580 (1.923)	0.377 (1.621)
Income	0.017*** (0.006)	0.021*** (0.006)	0.018*** (0.006)	0.028*** (0.007)	0.036*** (0.009)	0.032*** (0.008)
Metro area	-0.086 (0.069)	-0.035 (0.079)	-0.069 (0.080)	0.003 (0.091)	0.136 (0.121)	0.064 (0.105)
Number of screens	0.009 (0.009)	0.017 (0.012)	0.011 (0.011)	0.007 (0.012)	0.029 (0.022)	0.017 (0.017)
% 3D screen	0.181** (0.084)	0.463** (0.207)	0.272* (0.149)	0.214** (0.102)	0.955** (0.373)	0.551** (0.238)
Theater age	-0.018*** (0.006)	-0.014** (0.007)	-0.017*** (0.006)	-0.026*** (0.008)	-0.014 (0.011)	-0.021*** (0.008)
Constant	6.778*** (1.439)	6.676*** (1.487)	6.745*** (1.400)	6.998*** (1.871)	6.729*** (2.322)	6.876*** (1.934)
Fixed effects						
Chain	Yes	Yes	Yes	Yes	Yes	Yes
Observations	263	263	263	263	263	263

Note: The table presents 2SLS estimates of model (5) using the average admission price and average admission price on weekends as the dependent variable one by one. The endogenous regressor *Corporate* is instrumented by the instrumental variable *Land price* (in 2SLS) or *Corporate* (in two-step IV). Robust standard errors (clustered by market) are in parentheses. The notation \*\*\* indicates significance at 1% level, \*\* at 5% level, \* at 10% level.

price between franchised and corporate theaters of each chain, but not conclusive.

### Estimation of the full model

Now, I estimate the full model by maximum likelihood and discuss the results. I assume that the error terms  $u$  in performance model (5) and  $v$  in the cost function (7) are normally distributed. Then,  $\omega \equiv v - (1 - \mu)u$  is also normally distributed. Note that its conditional distribution is:

$$\omega|d \sim N\left(\frac{\sigma_{u\omega}}{\sigma_u^2}u, \sigma_\omega^2 - \frac{\sigma_{u\omega}^2}{\sigma_u^2}\right), \quad (9)$$

where  $\sigma_u^2$  and  $\sigma_\omega^2$  are the variances of  $u$  and  $\omega$ , and  $\sigma_{u\omega}$  is the covariance between them. Then, the joint density of performance  $d$  and organizational form *Corporate* is:

$$f(d)Pr(\text{Corporate}|d) = \begin{cases} \frac{1}{\sigma_u} \phi\left(\frac{u}{\sigma_u}\right) \Phi\left(-\frac{\alpha + \mathbf{x}_1(1-\mu)\beta - \mathbf{x}_2\gamma - (\sigma_{u\omega}/\sigma_u^2)u}{\sqrt{\sigma_\omega^2 - \sigma_{u\omega}^2/\sigma_u^2}}\right), & \text{if } \text{Corporate} = 0. \\ \frac{1}{\sigma_u} \phi\left(\frac{u}{\sigma_u}\right) \Phi\left(\frac{\alpha + \mathbf{x}_1(1-\mu)\beta - \mathbf{x}_2\gamma - (\sigma_{u\omega}/\sigma_u^2)u}{\sqrt{\sigma_\omega^2 - \sigma_{u\omega}^2/\sigma_u^2}}\right), & \text{if } \text{Corporate} = 1. \end{cases}$$

Same as before, I use the daily audience per seat as the measure of performance,  $d$ . Also, I impose 0.2 as the representative value of the ratio between royalty and Lerner index  $\mu$  and report estimates of performance model (5), cost model (7), and organizational form choice model (8) separately in Table 5.<sup>26</sup> The estimation results of the performance model are consistent with the IV estimates. First, the estimated performance difference between franchised and corporate theaters, 0.113, is not statistically significant. I also find evidence of the negative competition effect and positive effect of market size on a theater's performance. For instance, yearly audience per seat of an incumbent chain-affiliated theater decreases by 370 after entry of a competitor with 1,000 seats, while an influx of 1,000 new residents into the local market results in 0.4 more consumers per seat a year.<sup>27</sup> The results also suggest that theaters with higher quality of screens attract more consumers per seat.

The estimation of the cost function reveals that as expected, per-capacity fixed cost increases in response to the rise in the land price per square meter. Although not statistically significant, the negative signs of the coefficients of the demographic characteristics are reasonable given that in cost model (7), the fixed cost is divided by the price-cost margin. Factors affecting the performance and cost of a theater jointly determines the organization form of the theater. Estimates in the last column show that an affiliated theater is more likely to be operated corporately, if its market has more favorable conditions such as fewer competitors, larger market size, higher percentage between age of 20 and 30 years, and higher income as well as being located in a metropolitan city. In contrast, other things being equal, rise in land price causes an increase in rent of a theater, and eventually, incentivizes the chain to franchise it.

Franchising literature has shown that firms tend to geographically cluster their corporate (or franchised) establishments (Kalnins and Lafontaine, 2004; Kosová et al., 2013; Wilson, 2015a). This clustering may be attributed to the unobserved local market conditions that make running an establishment corporately more (or less) costly than franchising it. Or it may arise from the lower cost of monitoring an additional franchisee in a market where there are already other franchised units. Building off of this idea, I include in the cost function the share of corporate theaters among all nearby theaters of the same chain. Given that a chain usually establishes one theater at most in each district, I consider the share in the region (metropolitan city or province) rather than in the market (district).<sup>28</sup> Estimation results reported in Table A-5 show that the share does not affect

<sup>26</sup>As long as  $\mu$  is less than one which, in view of the relatively higher revenue share of a theater compared to the royalty in the industry analyzed here, is reasonable to assume, estimation of the performance model is not affected.

<sup>27</sup>Note that the number of competitors' seats is in 1,000 and the population size is in million.

<sup>28</sup>Six theaters that do not have any other theaters in the region that belong to the same chain are dropped from

Table 5: Estimation results of the full model

Variable	Model		
	Performance	Cost	Organizational form
Corporate	-0.113 (0.212)		
Number of competitors' seats	-0.102*** (0.022)		-0.102*** (0.022)
Population	1.073*** (0.217)		1.073*** (0.217)
Number of coffee shops	0.185* (0.096)	-0.053 (0.124)	0.201 (0.124)
% female	3.734 (3.986)	-1.415 (4.497)	4.403 (4.392)
% 20s	3.812** (1.777)	-2.301 (2.018)	5.351** (2.073)
Income	0.011 (0.010)	-0.025 (0.017)	0.034** (0.017)
Metro area	0.122 (0.084)	-0.107 (0.093)	0.204** (0.091)
Number of screens	0.026* (0.015)		0.026* (0.015)
% 3D screen	1.251*** (0.200)		1.251*** (0.200)
Theater age	0.006 (0.008)		0.006 (0.008)
Land price		0.035*** (0.011)	-0.035*** (0.011)
Constant	-1.650 (2.023)	2.259 (2.287)	-3.693 (2.267)
$\sigma_u$	0.522*** (0.035)		
$\sigma_w$			0.387*** (0.075)
$\sigma_{uw}$			-0.091 (0.059)
Fixed effects			
Chain	Yes	No	Yes
Observations		265	
Log likelihood		-319.2	

Note: The three models are estimated by maximum likelihood. The daily audience per seat is used as the performance measure. The notation \*\*\* indicates significance at 1% level, \*\* at 5% level, \* at 10% level.

the cost, and therefore, the organizational form choice. This result may be due to the fact that the share of corporate theaters is region-level, not market-level, or it may reflect that local markets in Korea are homogenous in terms of culture, regulations, and ethnicity, resulting in low incentive for chains to cluster corporate-run theaters or franchised ones.<sup>29</sup>

the analysis.

<sup>29</sup>I also consider the share of corporate theaters in the region as the instrumental variable in the 2SLS estimation

Finally, I further check the robustness of the findings by applying different radii from 0.1 to 1.61 kilometers (1 mile) in calculating the number of nearby coffee shops of each theater. Figure A-3 plots estimates of  $\alpha$  in the performance model and its 95 percent confidence band under different radii. Estimates from the reduced-form analysis (structural analysis) are in the left panel (right panel, respectively), showing that results are qualitatively the same under different radii.

## 4 Conclusion

In this article, I study the effect of organizational form of a chain-affiliated establishment on its performance. For this purpose, I develop an empirical model where organizational form and performance of a theater is simultaneously determined. Then, using cross-sectional movie theaters data, I conduct reduced-form analysis as well as estimating the full model by maximum likelihood.

Results of both analyses suggest that once the organizational form choice is endogenized, there remains no difference in performance between franchised and company-operated theaters after controlling for observed market conditions and theater characteristics. I also find evidence that the decision to franchise a theater does not affect the admission price. These findings suggest that chains adjust their governance forms accordingly so that in the end, there is no difference in the outcome that they care about – performance and price – across theaters confronted with different market conditions and theater characteristics. In this way, chains may obtain a uniformity in reputation across theaters.

There are several ways to extend the work of this article. First, while it may require a data set much larger than the one analyzed in this article, endogenizing the entry and expansion decision of an establishment or the choice of product/service quality would lead to a more comprehensive analysis. Second, this article focuses on the “dual-distribution” chains. Developing a model embracing other contractual forms in addition to franchising and corporate management would be another interesting topic.

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of the performance model. The first stage estimation results in Table A-6 show that the instrumental variable is too weak, resulting in a large standard error of the coefficient of *Corporate* in the second stage.

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## Appendix

Table A-1: Log-linear specifications

Variable	ln(Audience per seat)			ln(Admission price)		
	OLS	IV methods		OLS	IV methods	
		2SLS	Two-step		2SLS	Two-step
Corporate	0.271*** (0.053)	-0.189 (0.359)	-0.034 (0.294)	0.035*** (0.007)	-0.017 (0.039)	-0.088 (0.064)
Number of competitors' seats	-0.075*** (0.012)	-0.082*** (0.017)	-0.080*** (0.015)	-0.009*** (0.002)	-0.010*** (0.002)	-0.014*** (0.004)
Population	0.616*** (0.115)	0.790*** (0.199)	0.731*** (0.176)	0.126*** (0.024)	0.145*** (0.027)	0.232*** (0.038)
Number of coffee shops	0.123** (0.056)	0.115** (0.054)	0.118** (0.053)	0.006 (0.007)	0.005 (0.007)	0.006 (0.012)
% female	1.655 (3.204)	1.826 (3.631)	1.768 (3.398)	0.098 (0.406)	0.072 (0.422)	0.005 (0.629)
% 20s	2.178** (1.044)	3.250** (1.263)	2.890** (1.220)	-0.034 (0.170)	0.086 (0.185)	0.241 (0.260)
Income	0.007* (0.004)	0.011** (0.005)	0.010** (0.005)	0.002*** (0.001)	0.003*** (0.001)	0.005*** (0.001)
Metro area	0.045 (0.053)	0.108 (0.081)	0.087 (0.075)	-0.012 (0.010)	-0.005 (0.011)	0.018 (0.017)
Number of screens	0.010 (0.012)	0.020 (0.016)	0.017 (0.014)	0.001 (0.001)	0.002 (0.002)	0.004 (0.003)
% 3D screen	0.565*** (0.100)	0.921*** (0.288)	0.801*** (0.238)	0.025** (0.012)	0.066** (0.029)	0.131** (0.051)
Theater age	-0.006 (0.006)	-0.000 (0.009)	-0.002 (0.008)	-0.002*** (0.001)	-0.002* (0.001)	-0.002 (0.002)
Constant	4.683*** (1.591)	4.355** (1.800)	4.465*** (1.684)	1.906*** (0.204)	1.891*** (0.211)	1.899*** (0.315)
Fixed effects						
Chain	Yes	Yes	Yes	Yes	Yes	Yes
Observations	265	265	265	263	263	263

Note: The table presents 2SLS estimates of model (5) using the log of the daily audience per seat and the log of the average admission price as the dependent variable one by one. The endogenous regressor *Corporate* is instrumented by the instrumental variable *Land price* (in 2SLS) or *Corporate* (in two-step IV). Robust standard errors (clustered by market) are in parentheses. The notation \*\*\* indicates significance at 1% level, \*\* at 5% level, \* at 10% level.

Table A-2: Bootstrap estimates of the standard errors

Variable	Performance		Price	
	Audience per seat	Revenue per seat	Weekly price	Weekend price
Corporate	-0.253 (0.515)	-1.797 (3.900)	0.130 (0.307)	-0.116 (0.419)
Number of competitors' seats	-0.129*** (0.026)	-1.034*** (0.196)	-0.069*** (0.017)	-0.096*** (0.025)
Population	1.225*** (0.319)	10.544*** (2.400)	0.970*** (0.205)	1.560*** (0.267)
Number of coffee shops	0.216** (0.094)	1.732** (0.720)	0.045 (0.059)	0.057 (0.082)
% female	4.209 (4.778)	23.147 (35.153)	0.554 (3.074)	0.216 (4.209)
% 20s	4.610** (2.238)	32.996* (18.031)	-0.076 (1.524)	0.377 (1.975)
Income	0.016 (0.013)	0.138 (0.098)	0.018 (0.012)	0.032** (0.016)
Metro area	0.122 (0.104)	0.852 (0.811)	-0.069 (0.101)	0.064 (0.132)
Number of screens	0.030 (0.022)	0.255 (0.174)	0.011 (0.012)	0.017 (0.017)
% 3D screen	1.323*** (0.370)	10.245*** (2.791)	0.272 (0.201)	0.551* (0.284)
Theater age	0.000 (0.014)	-0.032 (0.102)	-0.017*** (0.006)	-0.021** (0.008)
Constant	-1.917 (2.495)	-10.467 (18.104)	6.745*** (1.555)	6.876*** (2.167)
Fixed effects				
Chain	Yes	Yes	Yes	Yes
Observations	265	265	263	263

Note: The table presents two-step IV estimates of model (5) using the daily audience per seat, the daily revenue per seat, the average admission price, and the average admission price on weekends as the dependent variable one by one. Bootstrap estimates of the standard errors (200 cluster bootstrap replications) are in parentheses. The notation \*\*\* indicates significance at 1% level, \*\* at 5% level, \* at 10% level.

Table A-3: First stage regression results

Variable	2SLS		Two-step IV	
	Coeff.	Std. Err.	Coeff.	Std. Err.
IV: $\widehat{Land\ price}$	-0.020	(0.006)***		
IV: $\widehat{Corporate}$			0.884	(0.223)***
Number of competitors' seats	-0.025	(0.016)	-0.002	(0.016)
Population	0.460	(0.177)**	0.040	(0.177)
Number of coffee shops	0.083	(0.060)	0.002	(0.054)
% female	2.027	(3.128)	-0.285	(3.123)
% 20s	3.046	(1.157)***	0.237	(1.206)
Income	0.015	(0.005)***	0.001	(0.005)
Metro area	0.167	(0.072)**	0.014	(0.080)
Number of screens	0.016	(0.013)	0.002	(0.013)
% 3D screen	0.790	(0.102)***	0.095	(0.166)
Theater age	0.016	(0.007)**	0.002	(0.007)
Constant	-1.633	(1.574)	0.082	(1.591)
Fixed effects				
Chain		Yes		Yes
$F$ -statistics on significance of IV		9.526		15.684
Observations		265		265

Note: The table presents first-stage estimation results of the 2SLS procedure where  $\widehat{Land\ price}$  (in 2SLS) and  $\widehat{Corporate}$  (in two-step IV) are used as the dependent variable one by one. Robust standard errors (clustered by market) are in parentheses. The notation \*\*\* indicates significance at 1% level, \*\* at 5% level, \* at 10% level.

Table A-4: Reduced-form analysis by chain

Variable	Audience per seat			Admission price		
	CGV	Lotte	Megabox	CGV	Lotte	Megabox
Corporate	-1.025 (1.246)	-0.312 (1.228)	-0.850 (0.861)	0.426 (0.597)	-0.118 (0.393)	-0.281 (0.536)
Number of competitors' seats	-0.176** (0.081)	-0.134*** (0.030)	-0.107*** (0.041)	-0.053 (0.033)	-0.055** (0.023)	-0.091*** (0.034)
Population	1.561** (0.699)	1.224*** (0.438)	1.600** (0.768)	0.987*** (0.256)	0.888*** (0.166)	1.215** (0.561)
Number of coffee shops	0.270 (0.276)	0.202* (0.113)	0.545** (0.226)	0.012 (0.103)	-0.023 (0.043)	0.138 (0.205)
% 20s	9.952* (5.383)	4.297 (5.078)	6.415* (3.635)	-0.593 (3.209)	1.130 (1.661)	-2.022 (2.932)
Income	0.079 (0.064)	-0.002 (0.017)	0.028 (0.019)	0.033 (0.029)	0.011 (0.008)	0.026* (0.014)
% 3D screen	2.141 (1.382)	1.576 (1.204)	0.754 (0.481)	0.086 (0.591)	0.305 (0.362)	-0.006 (0.303)
Theater age	-0.004 (0.026)	-0.005 (0.017)	0.086 (0.055)	-0.018* (0.011)	-0.016** (0.007)	0.021 (0.033)
Constant	-0.257 (0.771)	0.310 (0.620)	-0.428 (0.599)	6.960*** (0.412)	6.826*** (0.210)	6.995*** (0.394)
<i>F</i> -statistics on significance of IV	3.582	1.939	2.349	3.882	1.939	2.324
Observations	114	93	58	113	93	57

Note: The table presents 2SLS estimates of model (5) by chain. The daily audience per seat and the average admission price are used as the dependent variable one by one. The endogenous regressor *Corporate* is instrumented by the instrumental variable, *Land price*. Robust standard errors (clustered by market) are in parentheses. The notation \*\*\* indicates significance at 1% level, \*\* at 5% level, \* at 10% level.

Table A-5: Adding the regional share of corporate theaters in the cost function

Variable	Model		
	Performance	Cost	Organizational form
Corporate	-0.110 (0.209)		
Number of competitors' seats	-0.103*** (0.022)		-0.103*** (0.022)
Population	1.101*** (0.217)		1.101*** (0.217)
Number of coffee shops	0.168* (0.096)	-0.060 (0.129)	0.195 (0.129)
% female	4.880 (4.034)	-1.519 (4.698)	5.423 (4.671)
% 20s	4.191** (1.769)	-2.195 (2.080)	5.548** (2.152)
Income	0.012 (0.010)	-0.026 (0.017)	0.035** (0.018)
Metro area	0.111 (0.083)	-0.077 (0.100)	0.166* (0.099)
Number of screens	0.026* (0.015)		0.026* (0.015)
% 3D screen	1.261*** (0.195)		1.261*** (0.195)
Theater age	0.001 (0.009)		0.001 (0.009)
Land price		0.036*** (0.012)	-0.036*** (0.012)
Share of corporate theaters		-0.130 (0.145)	0.130 (0.145)
Constant	-2.253 (2.049)	2.341 (2.396)	-4.254* (2.418)
$\sigma_u$	0.514*** (0.035)		
$\sigma_w$			0.405*** (0.077)
$\sigma_{uw}$			-0.093 (0.060)
Fixed effects			
Chain	Yes	No	Yes
Observations		259	
Log likelihood		-309.9	

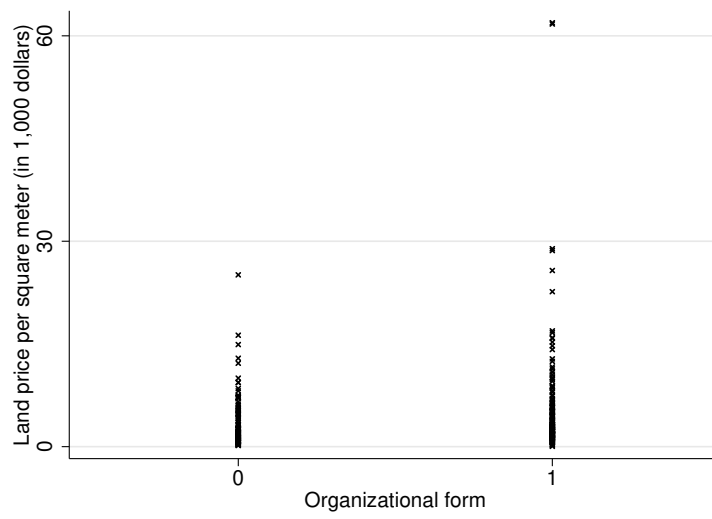
Note: The three models are estimated by maximum likelihood. The daily audience per seat is used as the performance measure. The notation \*\*\* indicates significance at 1% level, \*\* at 5% level, \* at 10% level.

Table A-6: Using the regional share of corporate theaters as the IV

Variable	First stage	Second stage	
		Performance	Price
Corporate		3.307 (8.674)	-0.679 (3.214)
IV: Share of corporate theaters	0.044 (0.127)		
Number of competitors' seats	-0.016 (0.015)	-0.071 (0.148)	-0.062 (0.053)
Population	0.381** (0.170)	-0.126 (3.293)	0.877 (1.238)
Number of coffee shops	-0.023 (0.062)	0.277 (0.290)	0.019 (0.089)
% female	0.693 (3.175)	2.786 (12.140)	0.609 (3.677)
% 20s	2.338** (1.122)	-3.518 (21.061)	1.996 (7.709)
Income	0.010* (0.005)	-0.019 (0.088)	0.017 (0.033)
Metro area	0.120 (0.080)	-0.355 (1.186)	-0.036 (0.406)
Number of screens	0.022* (0.013)	-0.048 (0.195)	0.030 (0.078)
% 3D screen	0.769*** (0.106)	-1.409 (6.616)	0.838 (2.489)
Theater age	0.012 (0.007)	-0.048 (0.109)	-0.002 (0.039)
Constant	-0.885 (1.581)	0.648 (9.582)	6.191** (2.507)
Fixed effects			
Chain	Yes	Yes	Yes
<i>F</i> -statistics on significance of IV		0.125	0.142
Observations	259	259	257

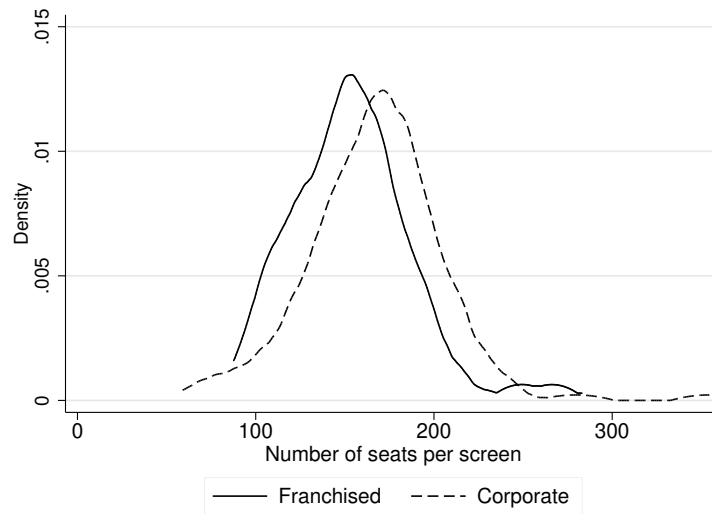
Note: The table presents 2SLS estimates of model (5) using the daily audience per seat and the average admission price as the dependent variable one by one. The endogenous regressor *Corporate* is instrumented by the instrumental variable, *Share of corporate theaters*. Robust standard errors (clustered by market) are in parentheses. The notation \*\*\* indicates significance at 1% level, \*\* at 5% level, \* at 10% level.

Figure A-1: Outliers in terms of land price



Note: Each point in the figure represents the land price (per square meter) and organizational form of a theater.

Figure A-2: Distribution of the screen size

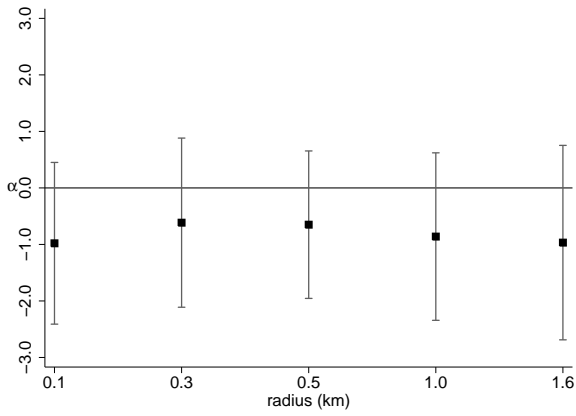


Note: The figure compares distributions of the screen size between the two organizational forms in the data.

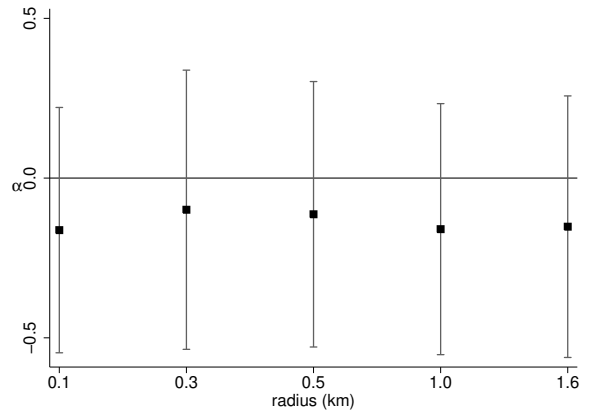


Figure A-3: Measuring the performance difference under different radii

(i) Reduced-form analysis (2SLS)



(ii) Structural analysis



Note: The figure plots estimates of  $\alpha$  in the performance model and its 95 percent confidence band under different radii in calculating the number of nearby coffee shops. Estimates in the left panel are from the reduced-form analysis (2SLS) and estimates in the right panel are from the estimation of the full model.